



## A study on clinical profile of Post-Covid syndrome in a tertiary care center from South India.

Meena Kumari P, Kalpana P, Prabhakar P

Date of Submission: 20-06-2023

Date of Acceptance: 29-06-2023

### ABSTRACT

**Introduction:**– Severe acute respiratory syndrome coronavirus – 2 (SARS- COV- 2) has emerged as a huge burden to health care system. The term “Acute covid-19” implies the disease duration from onset of infection up to 4 weeks. “Long COVID” (beyond 4 weeks) is divided into “ongoing symptomatic COVID (4-12 weeks beyond acute COVID\_19) and “Chronic Covid” or “Post COVID syndrome” (symptoms persisting beyond 12 weeks of onset of acute Covid-19. **Methodology:**This study is an observational cross-sectional study done in a special out patient department for post covid patients. Patients more than 18 years of age who had fulfilled the definitions of Post Covid syndrome were enrolled consecutively.**Results :** A total of 240 patients who fulfilled the definition of Post Covid syndrome were enrolled for the study. 54.2% had mild covid, 30.8% had moderate disease and 15% had severe disease. Diabetes and male gender are important risk factors for post covid syndrome in our study. 40.8% patients had associated comorbid condition. 21.6% of cases had diabetes 18.3% had hypertension. Fatigue was the most common symptom in 32.51% patients followed by palpitation (30%), dyspnea (21.6%) hair loss (20%) and myalgia (11.6%).**Conclusion:**A significant percent of patients suffer from post covid syndrome. The findings emphasise the need for patient -centered rehabilitation and post- covid care. Future research is imperative in understanding the risk factors for post covid syndrome.

### I. BACKGROUND

Coronavirus disease 2019 or Covid-19 also called as – Severe acute respiratory syndrome coronavirus – 2 (SARS- COV- 2) had caused an unprecedented global pandemic. It was believed initially as a short-term illness. The clinical recovery for mild cases was 2 weeks, but for those with moderate to severe disease took 3-6 weeks. For some, the symptoms persist for so long. Clinicians world -wide call these long-term effects of Covid-19 as long Covid-19 or PostCovid-19 syndrome (PCS)<sup>1,2</sup>

Studies indicate that Covid -19 result in long-term physical and mental health consequences

which last longer than three months after infection which is currently referred to as post covid – 19 syndrome.<sup>3,4</sup>

A comprehensive understanding of chronic or post COVID -19 syndrome includes symptoms and abnormalities persisting or present beyond 12- weeks of the onset of acute COVID -19 and not attributable to alternative diagnoses.<sup>5</sup>

The prevalence of post-COVID \_19 syndrome is variable across studies ranging from 15% up to 76% of infected individuals for at least six months after acute illness. As of mid -March 2022, SARS Cov – 2 pandemic has resulted more than 468 million infected cases worldwide and more than 6 million deaths. The burden in India March 22, 2022 is 4.3 crores and 5.1 lacs death cases. The prevalence of post covid syndrome using older definitions range from 15% to 76% which last for at least six months after acute illness.<sup>7,8</sup>

The long- term symptoms of COVID-19 involve many organs, and hence post COVID - 19 syndrome can be called as a multi system disorder. The effects occur irrespective of the initial severity of infection, but occur more frequently in women, middle age and in those with more symptoms initially.

Most patients recover but reports say approximately 10 – 20 % COVID-19 patients experienced persistent symptoms. Common symptoms are fatigue, shortness of breath cognitive dysfunction. Symptoms may be new onset following initial recovery from an acute COVID-19 episode or persist from the initial illness. Symptoms may also fluctuate or relapse over time.<sup>9</sup> There are not much studies from India regarding the prevalence of Post – COVID syndrome and we have used the revised guidelines of 12 weeks post acute infection. Hence it is imperative to study the variable manifestations of post COVID syndrome which would help in implementing the right public health measures.

### II. AIMS AND OBJECTIVES:

We aimed to study the prevalence and pattern of symptoms in post covid syndrome.

The study also analysed the symptoms according to organ system in patients with post covid syndrome after 12 weeks of infection.



### III. METHODOLOGY:

#### Study design:

This study is an observational cross-sectional study conducted in post covid out-patients department and medicine wards in Tirunelveli medical college from June 2021 to Dec 2021 in Post covidout patient department. The study was approved by the Institutional Ethics committee. Cases were enrolled consecutively.

**Participants: Inclusion criteria:** Patients with post covid symptoms who were initially confirmed to have covid infection by RT – PCR were enrolled for the study. Patients aged > 18 years who fulfilled the operational definition of post covid syndrome were enrolled for the study.

**Exclusion criteria:** Suspected covid -19 patients with RT – PCR negative report, Pregnancy, Chronic liver disease, chronic kidney disease, coronary artery disease, auto-immune disorder, Seizure disorder / neurological illness, active or treated Pulmonary Tuberculosis/ Chronic Obstructive Pulmonary Disease were excluded from the study.

A structured questionnaire was developed and details of socio-demographic, clinical, laboratory, radiological features, treatments and outcomes were recorded. Demographic details – age, sex, Comorbid illnesses, Clinical symptoms, Vitals: Heart rate, Respiratory rate, Blood

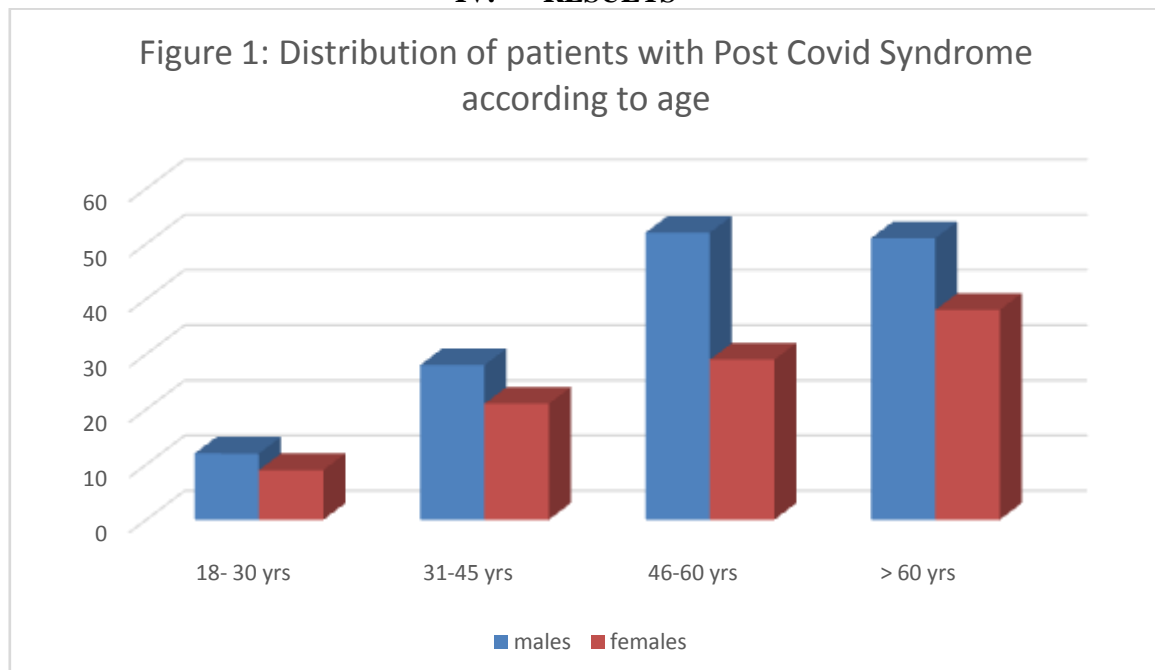
pressure, SPO2 by pulse oximetry. Detailed system examination was done. Laboratory values including Complete Hemogram, Blood sugar, liver function tests, renal function tests, C reactive protein. CT scan, USG, X ray chest were taken for deserving cases.

#### Operational definitions

According to ‘National institute for Health and care excellence’ guidelines. Acute covid-19 is onset of infection up to 4 weeks. ‘‘Long COVID’’ (beyond 4 weeks) is divided into ‘‘ongoing symptomatic COVID (4-12 weeks beyond acute COVID-19 syndrome’’ (symptom persisting beyond 12 weeks of onset of acute Covid-19).<sup>5</sup>

The severity of acute covid-19 was classified as mild, moderate or severe according to national guidelines. The patients with covid-19 without evidence of breathlessness or hypoxia during acute illness were categorised as mild covid-19 disease. Patients with breathlessness and oxygen saturation (spo<sub>2</sub>) of >90% and <93% were classified as moderate disease and those with spo<sub>2</sub> <90% were classified as severe covid-19 disease.<sup>10, 11</sup> Data was tabulated using Microsoft excel 2010. Statistical analysis was conducted using SPSS 23.0. results of age, duration of hospital stay are given as mean. Variables like comorbid illness, pattern of various symptoms are given as percentage.

### IV. RESULTS





**Table 1: Distribution of Post Covid patients according to gender**

	Male	Female	Total
Mild	81	49	130 (54.2%)
Moderate	42	32	74 (30.8)
Severe	20	16	36 (15%)
	143 (59.6)	97 (40.4)	100%

**Table 2: Prevalence of comorbid illness among Post Covid patients**

	Male	Female	Total
Comorbid	70 (29.1)	28 (11.6)	98 (40.8)
Diabetics	32 (13.3)	20 (8.3)	52 (21.6)
Hypertension	31 (12.9)	13 (5.4)	44 (18.3)
Malignancies	5 (2.08)	3 (1.25)	8 (3.3)

**Table 3: Pattern of systemwise symptoms in Post covidpatients**

**A. Neurological**

Fatigue	77	32.5%
Myalgia	28	11.6%
Headache	19	7.5%
Stroke	8	4.1%
Seizures	4	1.6%
Dysautonomia(giddiness, sweating)	29	12.5%
Mood disturbance	8	4.1%

**B. Cardiopulmonary**

Dyspnea	55	21.6%
Chest pain	20	8.3%
Palpitation	36	30%
Venous thrombosis	12	5%
Cough	11	4.6%

**C. Others**

Renal- Pedal oedema	14	5.8%
Skin- Hair loss	48	20%
Endocrine- New onset Diabetes	20	8.3%

840 patients who were infected with covid were examined. Out of them 240 patients who fulfilled the inclusion criteria were enrolled for the study. Among them 143 (59.6) were males and 127 (40.4) were females. Age of the patients ranged from 18 years to 74 years. The mean age was 43.8+7.6 years. The prevalence of post covid syndrome was higher in elder age groups. (Figure 1). The male female ratio was 1.5:1. Of the 240 patients 54.2% had mild covid, 30.8% had moderate disease and 15% had severe disease. (Table 1)

110 out of 240 patients needed hospitalisation (moderate to severe). 130 patients had received follow up as out patients. 45 out of 52 diabetic patients needed hospitalization. 38 out of 44 hypertensive patients needed hospitalisation.

40.8% patients had associated comorbid condition. Diabetes was the commonest risk factor noted. While 21.6% of cases had diabetes, 18.3% had hypertension, 8 patients had received treatment for malignancies. (Table 2) Only 18 out of 240

patients had received covid vaccine (7.5%) prior to the covid illness.

Among the patients who attended the "Post Covid out-patient department" fatigue was the most common symptom of (n=39) 32.51 followed by dyspnea (21.6%) hair loss (20%) and myalgia (11.6%). Cardiopulmonary and neurological symptoms were predominant. Fatigue is the commonest neurological symptoms. 12.5% had autonomic symptoms including frequent giddiness and abnormal sweating. Headache was reported in 7.5% and mood disturbances in 4.1% cases. Serious post covid sequelae were noticed as stroke and seizures in 4.1% and 1.6% cases respectively.

Palpitation is the most frequent cardiopulmonary symptom reported by 36 patients (30%) followed by chest pain by 20 patients (8.3%). The prevalence of cough was reported only in 4.6% cases.



14 patients turned up with pedal edema and had proteinuria. 48 patients complained of hair loss (20%) and 7 patients complained of hyperpigmentation of face and knuckles. 20 patients had developed new onset diabetes after covid infection.(Table 3)

## V. DISCUSSION

Not much studies are available after the new definition of post covid syndrome came into vogue. In a study by Menges et al postcovid symptoms were present in 89% participants at diagnosis and 19% had received in-patient treatments. After 6 months 26% patient reported symptoms of fatigue (55%) dyspnea (26%)<sup>7</sup>. A study by Naik showed prevalence of post covid syndrome to be 9.9%. Study by Moreno et al in Mediterranean population reported prevalence of Post Covid Syndrome as 50.9%<sup>12,13</sup>. Previous studies in post covid syndrome designated those who had symptoms persisting before 4 weeks. But in our study the prevalence is 25.2% and the difference is due to the criteria of 12 weeks time duration.

Fatigue, dyspnoea and hair loss are the main symptoms. Other studies have not reported on hair loss as a symptom. A study by Banda et al reported fatigue (62%), dyspnoea (19%) tachycardia / palpitation (13%) and dyspnoea (19%). But the study was done in > 60 days follow up. But our study was done in > 84 days and fatigue is the most common post covid symptom in our study (n=77, 32.5%)

Comorbid conditions were reported in only 23.7% of that study whereas in our study, 40.8% had comorbid conditions.<sup>14</sup> The prevalence of diabetes as a comorbid factor is very 21.6%, whereas it is only 0.8% in the study by Augustin et al. India is the diabetic capital of the world. Our study was done including patients who were hospitalized. Patients with diabetes developed moderate to severe disease. So, this explains the high prevalence of diabetes as a risk factor in contrast to the study done by Augustin et al in non hospitalized patients.<sup>2</sup> A US study of over 2000 patients admitted to hospital found that covid-19, sepsis, pneumonia and heart readmission post covid.<sup>15</sup>

The difference may be due to the geographic variations and the sub-urban to rural populations included in the study where the main occupation involve manual labour, agriculture, and high anaemia prevalence.

Respiratory involvement can be in the form of Post covid diffuse lung disease, Pulmonary embolism and secondary pulmonary infection. The

patients present with cough and chest pain.<sup>16</sup> Cardiovascular symptoms are common in severe COVID. Up to 20-30% patients with severe covid have evidence of myocardial involvement, venous thrombo embolism, heart failure and arrhythmias.

Direct cardio myocyte damage or damage due to hypoxia, cytokine storm are reasons for cardiac sequelae. The long term sequelae include increase cardiometabolic demands, myocardial fibrosis, LV dysfunction, inappropriate sinus tachycardia and autonomic dysfunction. Ongoing chest pain and palpitations are noted in 5% and 9% respectively at six months follow up. Gastrointestinal Sequelae include ageusia, loss of appetite, nausea, vomiting, dyspepsia, diarrhea, abdominal pain.<sup>17</sup>

SARS CoV-2 has a high affinity for human ACE 2 receptor. This receptor is also expressed in neurons, glial cells, which explains factory neuropathy, peripheral neuropathy and brain dysfunction. Common post covid symptoms are fatigue, impaired memory, sleep disorder, dizziness, anosmia, ageusia, persistent myalgia, headache and parasthesia. Dysautonomia causes dizziness, palpitation, presyncope. Up to 12% pts show abnormal autonomic functions. Sleep disorders 18-30% and cognitive impairment 12-50% are reported from various studies. Rudroff et al proposed decreased levels of neurotransmitters, reduced neuronal excitability, inflammation and inhibition in the firing of motor neuron units as reasons for post covid fatigue.<sup>18</sup>

The neuro immunomodulation through the vagus nerve is implicated in cough hypersensitivity causing persistent cough.<sup>19</sup> The prevalence of anaemia, other, endocrine, systemic disease were not evaluated in such patients and the influences of such disease cannot be ruled out.

Renal Sequelae include acute kidney injury – 80-90% get complete recovery, chronic kidney disease, glomerular disease and hypertension. Up to 14% of acute covid infection develop kidney dysfunction. Signs of post-covid nephrological complications are new onset or worsening hypertension, anemia, facial puffiness and pedal edema. Kidney involvement in covid 19 is due to the presence of angiotensin converting enzyme 2 (ACE 2) receptor which is used as port of viral entry into targeted cells, tissue tropism and viral replication. Angiotensin 1-7 exerts vasodilatory, anti-inflammatory, anti fibrotic and diuretic actions. Loss of this activity is the basis of renal damage.<sup>20</sup>

8.3% (n=48) patients had hair loss. Inflammatory skin conditions have variable presentations like pigmentary change and violaceous colouratum.<sup>7</sup>



patients presented with hyperpigmentation of face and knuckles. Several studies have suggested that hair loss is associated with covid-19. Though cutaneous lesions like rash, chill blain lesions in acral skin, pernio like lesions are common in acute covid, such lesions are uncommon in post-covid. Our patients had new onset diffuse hair loss significant to be called as Telogen Effluvium. TE occurs secondary to a systemic stressor and results in premature follicular transition from anagen to the telogen phase.<sup>21</sup>

## VI. CONCLUSION

The multi organ involvement of covid 19 beyond the acute phase have thrown light on the organ specific complications. Future studies are of paramount importance in documenting new clinical symptoms and monitoring the and treating ongoing symptoms. The Post Covid Clinics should have specialists have multiple disciplines and provide comprehensive care in the outpatient setting.

Conflicts of Interest : There are no conflicts of interest

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